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(71) Applicant *(for all designated States except US)*: **FEDERAL-MOGUL S.A.** [BE/BE]; Avenue Champion, B-6790 Aubange (BE).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **BOLAND, Xavier** [BE/BE]; Federal-Mogul S.A., Avenue Champion, B-6790 Aubange (BE). **HENIN, Pierre** [BE/BE]; Federal-Mogul S.A., Avenue Champion, B-6790 Aubange (BE). **COOS, Eric** [BE/BE]; Federal-Mogul S.A., Avenue Champion, B-6790 Aubange (BE).

(74) Agent: **HOOIVELD, Arjen, J., W.**; Arnold & Siedsma, Sweelinckplein 1, NL-2517 GK The Hague (NL).

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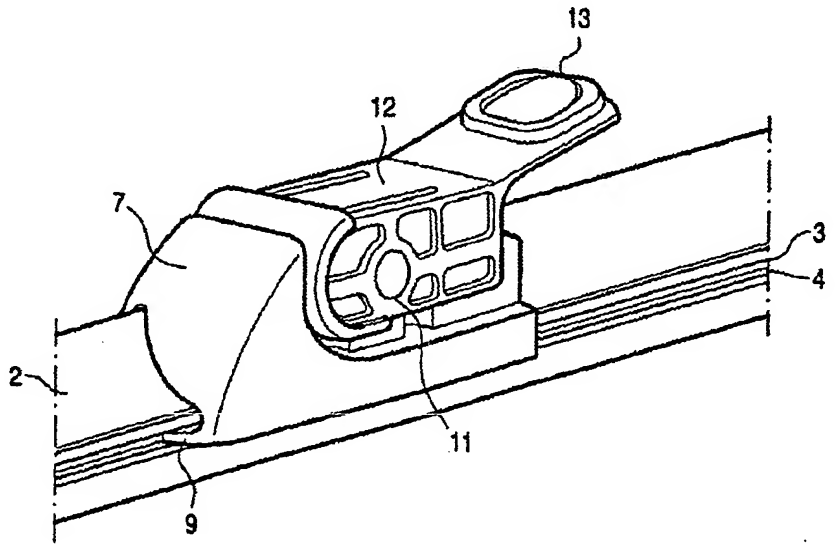
(54) Title: A WINDSCREEN WIPER DEVICE



(57) Abstract: A windscreen wiper device (1) comprising an elastic, elongated carrier element, as well as an elongated wiper blade (2) of a flexible material, which can be placed in abutment with a windscreen to be wiped, which wiper blade (2) includes opposing longitudinal grooves (3) on its longitudinal sides, in which grooves (3) spaced-apart longitudinal strips (4) of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips (4) are interconnected by a respective connecting piece (6), which windscreen wiper device comprises a connecting device (7) for an oscillating arm (8), wherein said oscillating arm (8) is pivotally connected to said connecting device (7) about a pivot axis near one end, with the interposition of a joint part (12), with the special feature that said connecting device (7) is positioned at least substantially within said joint part (12).

WO 2004/028875 A1

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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A WINDSCREEN WIPER DEVICE

The present invention relates to a windscreen wiper device comprising an elastic, elongated carrier element, as well as an elongated wiper blade of a flexible material, which can be placed in abutment with a windscreen to be wiped, which wiper blade includes opposing longitudinal grooves on its longitudinal sides, in which grooves spaced-apart longitudinal strips of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips are interconnected by a respective connecting piece, which windscreen wiper device comprises a connecting device for an oscillating arm, wherein said oscillating arm is pivotally connected to said connecting device about a pivot axis near one end, with the interposition of a joint part.

Such a windscreen wiper device is known from German patent publication no. 101 30 903 (Robert Bosch GmbH). This prior art windscreen wiper device is designed as a "yokeless" wiper device, wherein no use is made of several yokes pivotally connected to each other, but wherein the wiper blade is biassed by the carrier element, as a result of which it exhibits a specific curvature. This known device has a first coupling half fixed to the oscillating arm, as well as a second coupling half fixed to the wiper blade, wherein two parallel interspaced supporting walls of the second coupling half are oriented in the longitudinal direction of the wiper blade. Each end of a pivot pin for a joint part, which is mounted on the pivot pin in a manner that permits it to swing between the supporting walls and which is provided for connecting the oscillating arm, is held in these supporting walls. In order to obtain protection against environmental

influences such as snow, ice and dust, the oscillating arm is u-shaped in the area of its coupling half, whereby the U-base covers the supporting (protective) walls and both U-limbs cover the outer sides of these supporting walls.

A disadvantage of the windscreen wiper device known from the above-mentioned German patent document is that, due to high forces exerted in practice on the connection between the connecting device and the oscillating arm, the reliability of said connection appaers to diminish with the passage of time, resulting in play between the connecting device and the oscillating arm. Such a play in practice has proven to lead to frictional contact between these parts and therefore to wear. A further disadvantage thereof is that many constructional parts are involved in the connection between the connecting device and the oscillating arm, making the known windscreen wiper device laborious to manufacture and therefore relatively costly.

The object of the invention is to overcome these drawbacks of the prior art as indicated above, in particular to provide a windscreen wiper device wherein the connecting device and the oscillating arm are interconnected in a simple though durable and solid manner.

In order to accomplish that objective, a windscreen wiper device of the type referred to in the introduction is characterized in that said connecting device is positioned at least substantially within said joint part. Particularly, this enables to attach said joint part to said connecting device by protrusions of said connecting device at the location of said pivot axis, said protrusions pivotally engaging in recesses provided in said joint part. These

protrusions that function as bearing surfaces are spaced far apart, so that the forces exerted on the bearing surfaces will be relatively low. As these protrusions replace the pivot pin as used in the known windscreen wiper device discussed above, less constructional components are used in connecting the connection device and the oscillating arm together. For an optimal articulation at the location of the protrusions the distance between these protrusions divided by the length of the wiper blade, from tip to tip, is larger than 0,02.

In one preferred embodiment of a windscreen wiper device according to the invention said joint part has an at least substantially U-shaped cross-section at the location of its attachment to said connecting device, wherein said joint part in each leg of said U-shaped cross-section is provided with a recess provided coaxially with said pivot axis. Preferably, the protrusions extend outwards on either side of said connecting device (that is, outwardly in lateral direction with respect to the oscillating arm), wherein the protrusions are at least substantially cylindrical. Particularly, the recesses are correspondingly shaped.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part is made of plastic, which includes any synthetic material having some flexibility.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part comprises at least one resilient tongue engaging in a correspondingly shaped hole provided in said oscillating arm. Preferably, the oscillating arm has an at least substantially U-shaped cross-

section at the location of its connection to said joint part, wherein said hole is provided in a base of said U-shaped cross-section.

In another preferred embodiment of a windscreen wiper device according to the invention said joint part comprises at least two lateral resilient tongues extending outwardly, wherein the oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, and wherein each tongue engages in a correspondingly shaped hole provided in a leg of said U-shaped cross-section.

While mounting the oscillating arm onto the connecting device/joint part, the resilient tongue(s) is/are initially pushed in against a spring force and then allowed to spring back into said hole(s), thus snapping, that is clipping the resilient tongue(s) into the hole(s).

In another preferred embodiment of a windscreen wiper device according to the invention said hole(s) has/have a closed circumference. Such (a) closed hole(s) enhance(s) the retention of the oscillating arm onto the connecting device/joint part in all directions, particularly both horizontally and vertically.

In another preferred embodiment of a windscreen wiper device according to the invention the oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, and wherein each leg comprises clamping members which engage rond longitudinal sides of said joint part that face away from each other. These clamping members being preferably formed as inwardly bended edges integral with the legs of the U-shaped cross-

section, serve to further enhance the retention of the oscillating arm onto the connecting device/joint part in vertical direction, that is perpendicular to the longitudinal direction of the oscillating arm.

The invention will now be explained in more detail with reference to figures illustrated in a drawing, wherein:

- Figure 1 is a perspective, schematic view of a preferred embodiment of a windscreen device in accordance with the invention;

- Figures 2 and 3 show details of the windscreen wiper device of figure 1, wherein various successive steps are shown for fitting an oscillating wiper arm to a connecting device using two different types of joint parts ("spacers");

- Figure 4 is a perspective and schematic view of an end of an oscillating wiper arm used in figure 3.

Figure 1 shows a preferred variant of a windscreen wiper device 1 according to the invention. Said windscreen wiper device is built up of an elastomeric wiper blade 2, in the longitudinal sides of which opposing longitudinal grooves 3 are formed, and of longitudinal strips 4 made of spring band steel, which are fitted in said longitudinal grooves 3. Said strips 4 form a flexible carrier element for the rubber wiper blade 2, as it were, which is thus biassed in a curved position (the curvature in operative position being that of a windscreen to be wiped). Neighbouring ends 5 of strips 4 are interconnected on either side of the windscreen wiper device 1 by means of connecting pieces 6 functioning as clamping

members. In this embodiment, the connecting pieces 6 are separate constructional elements, which may be form-locked ("positive locking" or "having positive fit") as well as force-locked to the ends 5 of strips 4. In another preferred variant, said connecting pieces 6 are in one piece with the strips 4 made of spring band steel. In the latter case said connecting pieces form transverse bridges for the strips 4, as it were.

The windscreen wiper device 1 is furthermore built up of a connecting device 7 of plastic material for an oscillating wiper arm 8. Connecting device 7 comprises clamping members 9 that are integral therewith, which engage round longitudinal sides 10 of the strips 4 that face away from each other, as a result of which the connecting device 7 is firmly attached to the unit consisting of wiper blade 2 and strips 4. The oscillating wiper arm 8 is pivotally connected to the connecting device 7 about a pivot axis near one end, and that in the following manner.

With reference to figure 2 the connecting device 7 comprises two cylindrical protrusions 10 extending outwards on either side of said connecting device 7 (figure 2a). These protrusions 10 pivotally engage in identically shaped cylindrical recesses 11 of a plastic joint part 12 (figure 2b). Said protrusions 10 act as bearing surfaces at the location of a pivot axis in order to pivot the joint part 12 (and the oscillating wiper arm 8 attached thereto) about said pivot axis near one end of said arm 8. The protrusions 10 are preferably in one piece with the connecting device 7; in the alternative, the protrusions 10 are part of a single pivot pin perpendicular to the connecting device 7. Said connecting device 7 may be equipped with a cover or cap in order to

obtain an aesthetic appearance thereof, to avoid sharp edges and to provide protection against UV-light etcetera. The joint part 12 comprises two lateral resilient tongues 13 extending outwardly, while the oscillating arm 8 has a U-shaped cross-section at the location of its connection to said joint part 12, so that each tongue 13 engages in an identically shaped hole 14 provided in a leg 15 of said U-shaped cross-section (figure 2c).

Figures 3a, 3b and 3c correspond to figures 2a, 2b and 2c, respectively, with the difference that one resilient tongue 13 in figure 3 fitting in a hole 14 provided in a base 16 of the U-shaped cross-section (figure 3c).

Referring to both figures 2 and 3, while mounting the oscillating wiper arm 8 onto the connecting device 7/joint part 12, the resilient tongue(s) 13 is/are initially pushed in against a spring force and then allowed to spring back into said hole(s) 14, thus snapping, that is clipping the resilient tongue(s) 13 into the hole(s) 14. This is a so-called bayonet-connection.

Each leg 15 of the U-shaped ross-section comprises clamping members which engage rond longitudinal sides of said joint part 12 that face away from each other. In figures 2, 3 and 4 these clamping members are formed as inwardly bended edges 17 integral with the legs 15 of the U-shaped cross-section, serving to further enhance the retention of the oscillating arm 8 onto the connecting device 7/joint part 12 in vertical direction, that is perpendicular to the longitudinal direction of the oscillating wiper arm 8.

Possibly, a spoiler 18 is furthermore provided (figure 1).

In order to achieve a good connection at the location of the protrusions 10, the distance between these protrusions 10 (from tip to tip) divided by the length of the wiper blade 2 (from tip to tip) is larger than 0,02 (2%). Said distance between the protrusions 10 preferably varies between 10 and 20 mm.

The invention is not restricted to the variants shown in the drawing, but it also extends to other embodiments that fall within the scope of the appended claims.

CLAIMS

1. A windscreen wiper device comprising an elastic, elongated carrier element, as well as an elongated wiper blade of a flexible material, which can be placed in abutment with a windscreen to be wiped, which wiper blade includes opposing longitudinal grooves on its longitudinal sides, in which grooves spaced-apart longitudinal strips of the carrier element are disposed, wherein neighbouring ends of said longitudinal strips are interconnected by a respective connecting piece, which windscreen wiper device comprises a connecting device for an oscillating arm, wherein said oscillating arm is pivotally connected to said connecting device about a pivot axis near one end, with the interposition of a joint part, **characterized in that** said connecting device is positioned at least substantially within said joint part.

2. A windscreen wiper device according to claim 1, wherein said joint part is attached to said connecting device by pivotally engaging protrusions of said connecting device at the location of said pivot axis in recesses provided in said joint part.

3. A windscreen wiper device according to claim 2, wherein said joint part has an at least substantially U-shaped cross-section at the location of its attachment to said connecting device, and wherein said joint part in each leg of said U-shaped cross-section is provided with a recess provided coaxially with said pivot axis.

4. A windscreen wiper device according to claim 2 or 3, wherein the protrusions extend outwards on either side of said connecting device and wherein the protrusions are at least substantially cylindrical.

5. A windscreen wiper device according to any of the preceding claims 1 through 4, wherein said joint part is made of plastic.

6. A windscreen wiper device according to any of the preceding claims 1 through 5, wherein said joint part comprises at least one resilient tongue engaging in a correspondingly shaped hole provided in said oscillating arm.

7. A windscreen wiper device according to claim 6, wherein the oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, and wherein said hole is provided in a base of said U-shaped cross-section.

8. A windscreen wiper decice according to claim 6 or 7, wherein said joint part comprises at least two lateral resilient tongues extending outwardly, wherein the oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, and wherein each tongue engages in a correspondingly shaped hole provided in a leg of said U-shaped cross-section.

9. A windscreen wiper device according to claim 6, 7 or 8, wherein said hole(s) has/have a closed circumference.

A windscreen wiper device according to any of the preceding claims 1 through 9, wherein the oscillating arm has an at least substantially U-shaped cross-section at the location of its connection to said joint part, and wherein each leg comprises clamping members which engage rond longitudinal sides of said joint part that face away from each other.

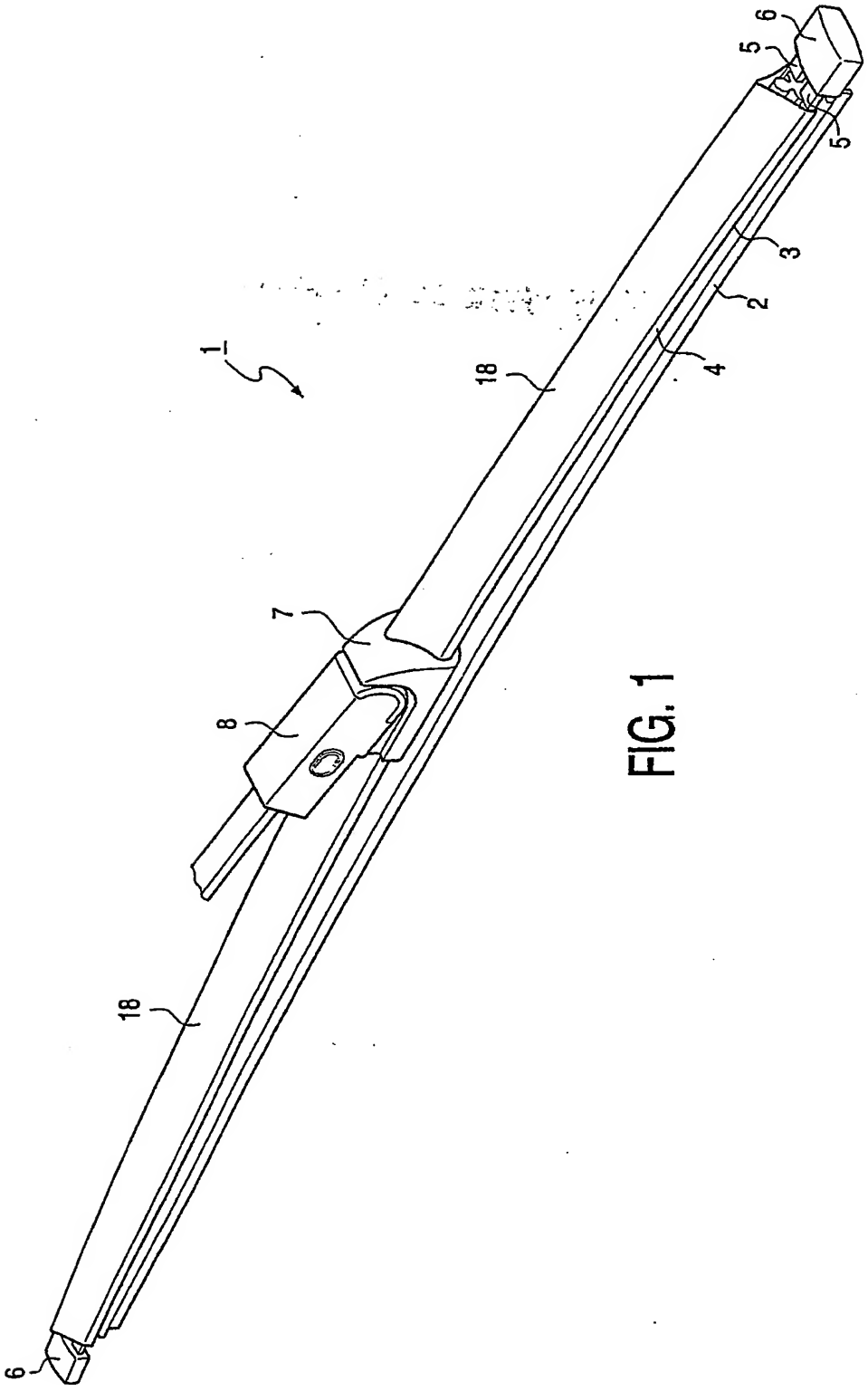

FIG. 1

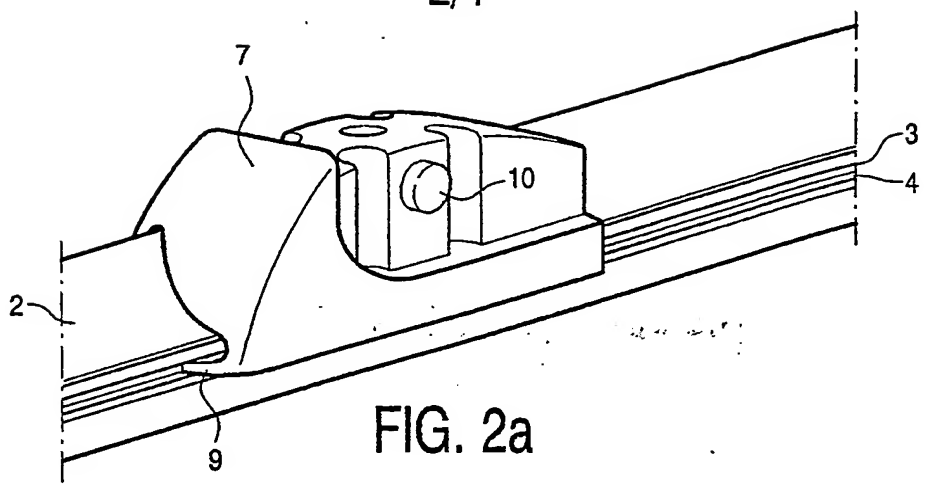

FIG. 2a

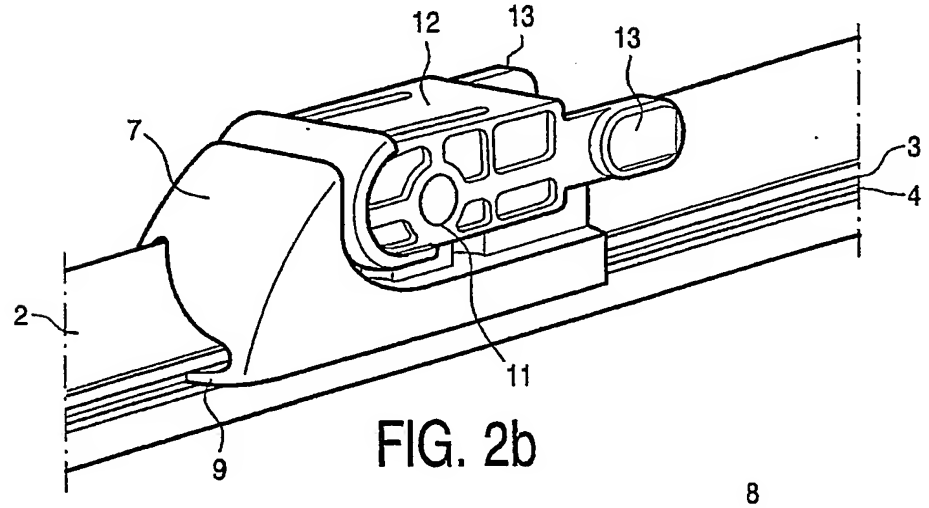

FIG. 2b

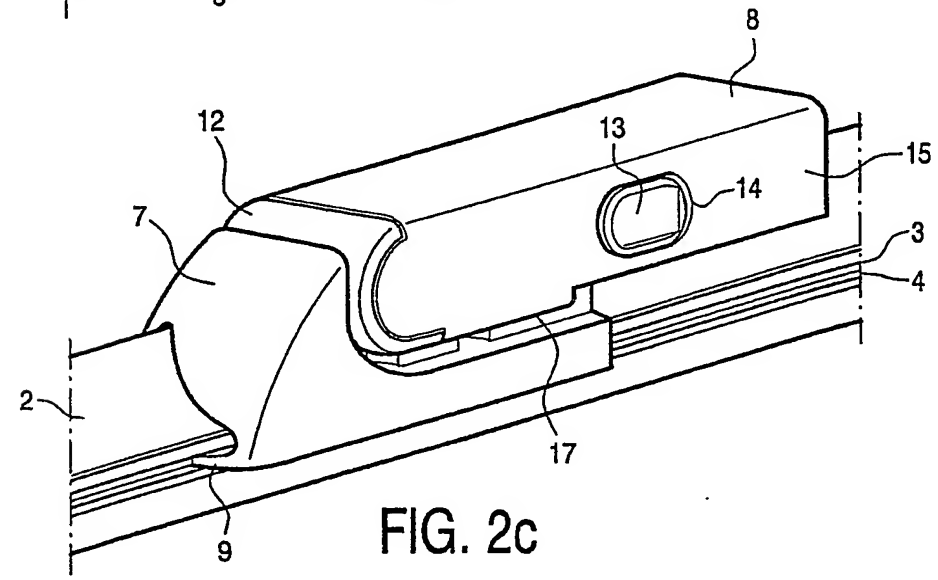

FIG. 2c

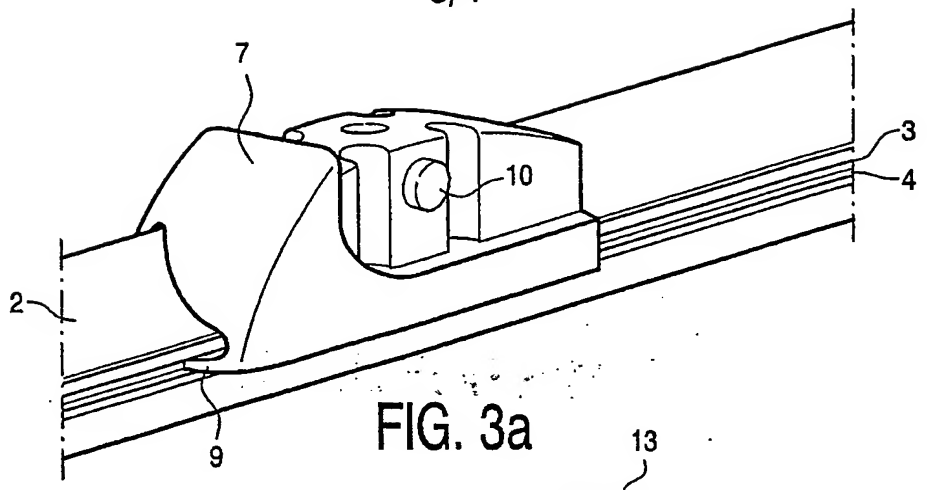

FIG. 3a

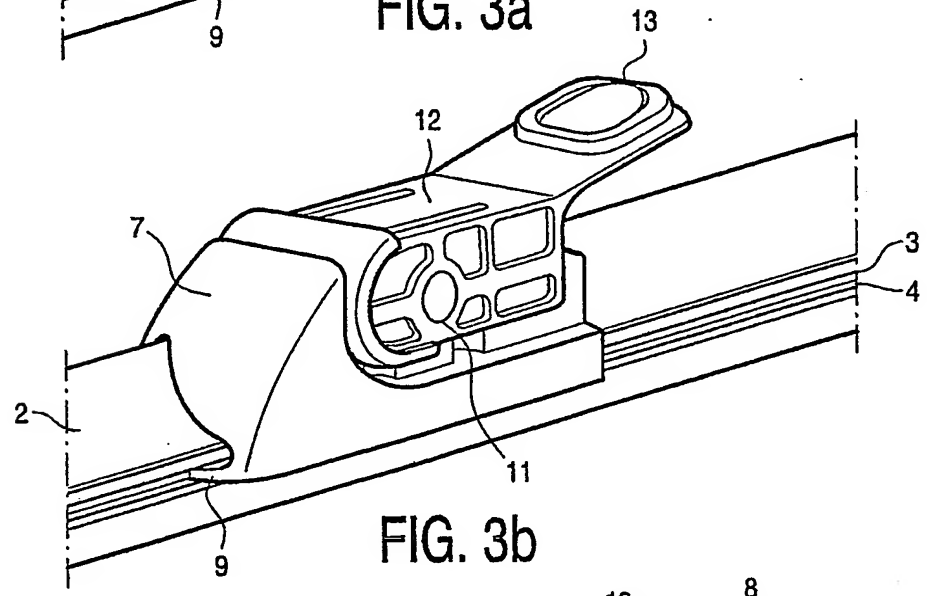

FIG. 3b

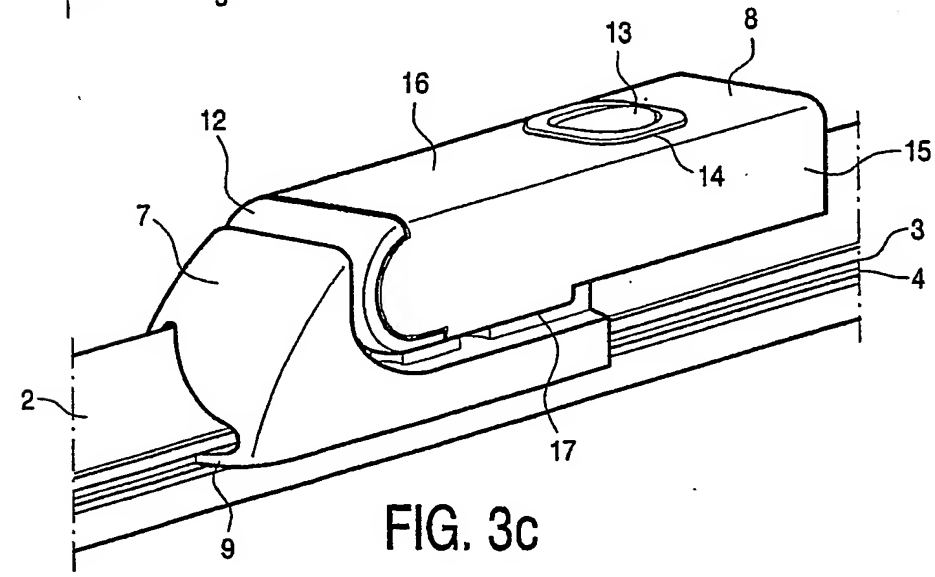

FIG. 3c

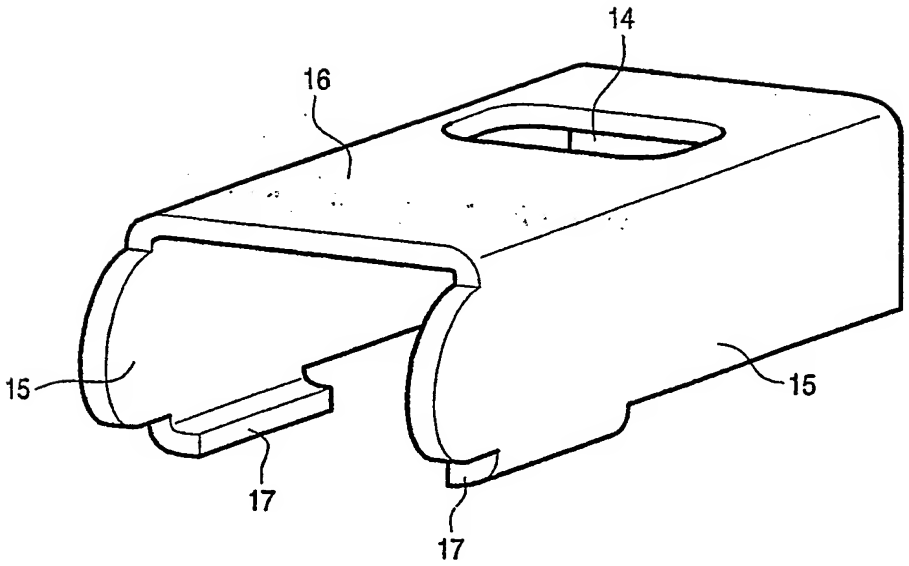

FIG. 4

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 B60S1/40 B60S1/38

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 B60S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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Date of the actual completion of the international search	Date of mailing of the international search report
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Inter[illegible] Application No
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